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the views of science held by the distinguished author in his later years. In the very delicate task of eliminating such errors as the progress of science has developed, and at the same time of deferring almost reverentially to the opinion of the author, Dr. Rice appears to have attained a high degree of success, although some further eliminations of opinions and interpretations which, though not absolutely abandoned by all geologists, have been practically overthrown, might have added value to the work.

T. C. C.

Fossil Plants for Students of Botany and Geology, Vol. I, 450 pp., with illustrations. By A. C. SEWARD, University Press, Cambridge, Eng., 1898.

Botanists and geologists both are bound to welcome Professor Seward's work on Fossil Plants, the first volume of which has recently appeared. This book forms one of the familiar Cambridge Natural Science Manuals, and is rather more extensive than the others. It is safe to say that no general work on palæobotany had previously appeared in English that was satisfactory to both botanists and geologists, and very few that were satisfactory to either. Hence it is a pleasure to read in the preface that this book is intended for both botanists and geologists, and thus has to be adapted to both non-geologists and non-botanists, since it is unfortunately true that neither class, as a rule, appreciates the standpoint of the other. The first chapter contains a brief historical sketch of palæobotany in which the author gives special credit to Brongniart and Williamson. Chapter ii gives the relation of the subject to botany and geology. Professor Seward tells how palæobotany has been buffeted about by the geologist and the botanist, the one culling out facts relating to correlation of strata, the other caring only for facts which give hints as to phylogeny and evolution. He pleads for the recognition of palæobotany as a science of and for itself, with its own peculiar problems, viz., the determination of the historical succession of plants in geological time; the delineation of the actual evolution of the plant kingdom, giving light on phylogenetic mysteries; the presentation of the various floral areas of the past, leading up to an explanation of the distribution of plants in the present day; conclusions as to climatic and other conditions in geological time as revealed by the occurrence of certain peculiar plant types and

by anatomical adaptations to environment. The third chapter gives the leading facts of geological history, and is designed for botanical readers. The next chapter discusses the various methods for the preservation of plants as fossils; structure unmodified, as in fossil soils and forests; carbonization; incrustation, as travertine; casts; petrifications. The relative rarity of plant fossils is due to their soft structure and land habitats. Chapter v is exceedingly interesting and valuable, as it demonstrates the enormous difficulties and sources of error, such as (1) the danger of depending too much on external resemblances, since many forms from algæ up to seed plants may look alike even in modern forms, much more in fossils; (2) fragmental preservation—this is much more common than in animal fossils, and also leads to much more error, since a plant often can be identified only in fruit; (3) decorticated trunk and pith cylinders; (4) resemblance to animals or animal tracks and mineral deposits.

After a chapter on nomenclature, the author takes up the plants by groups. In this first volume he treats only of the Thallophytes, Bryophytes, and some Pteridophytes. Among the algæ there is an abundance of undoubted fossil blue-green algæ, forming deposits of travertine and possibly oölite. Professor Seward thinks that similar forms probably represented the first life of the Algonkian. Because of their siliceous tests there are vast deposits of diatoms, mainly from the Cretaceous on. Of the larger marine algæ those forms are especially preserved which are covered during life by calcareous incrustations, especially the corallines. Many plants of all kinds and many mineral deposits, rill marks, and animal tracks have been referred to the algæ, and especially to the fucoids. Among fungi there are abundant evidences of fossil bacteria, but the higher forms are rare, though found in the Carboniferous and Tertiary. The liverworts and mosses are poorly preserved and difficult to identify. Of the Pteridophytes, the author considers in this volume only the equisetales and sphenophyllales. Both of these groups are abundantly preserved and well known. At the close of the volume is an excellent bibliography.

This work of Seward's has at least three features to commend it that are by no means common to all books on palæobotany. It is extremely cautious in its statements; many forms commonly described are either classified tentatively or omitted altogether. There are not so many startling allusions to high-grade plants in the early ages, but there are more real facts on which to base safe conclusions. Another

valuable feature of the book is that important facts have been culled out from a mass of unimportant material; and by no means least in its commendable qualities is the fact that it is actually readable; even the botanical or geological layman may enjoy it if he cares for such things at all. Everyone who reads the first volume will anxiously await the appearance of the second.

HENRY C. COWLES.

Northward Over the "Great Ice": A Narrative of Life and Work along the Shores and upon the Interior Ice-Cap of Northern Greenland in the years 1886 and 1891-1897. By ROBERT E. PEARY. 2 vols. Illustrated. Frederick A. Stokes Co., New York. 1898.

In these two volumes, embracing nearly 1200 pages, Lieutenant Peary has given a graphic account of his entire Arctic work. The story begins with a reconnaissance of the inland ice of Greenland in 1886. The objects and results of this reconnaissance he summarizes as follows:

Objects.—To gain a practical knowledge of the obstacles and ice conditions of the interior of Greenland; to put to the test of actual use certain methods and details of equipment; to make such scientific observations as may be practicable; and to push into the interior as far as possible. (Paper read before National Academy of Sciences at Washington, D. C., April 23, 1886.)

Results.—Attainment of greater elevation than ever before reached on the inland ice; penetration a greater distance than any white man previously; attainment for first time of the real interior plateau of unchanging snow; determination of ruling characteristics of the inland ice from border to interior (see article in *Bulletin Am. Geog. Soc.*, No. 3, 1887, pp. 286-288); securing an invaluable fund of definite practical knowledge and experience of actual ice-cap conditions and necessary equipment, as well as practical knowledge of Arctic navigation and a familiarity with a considerable extent of the Arctic coasts; inception of ideas of pronounced future value, as odometer, sails, etc. The following deductions: Attacks upon the inland ice should be made at a point as far above level of sea as possible, and where the presence of large and rapidly discharging glaciers indicates a rapid ascent to high elevations in close proximity to coast; party should be *small*, and thoroughly accustomed to snowshoes and ski; surface of inland ice offers imperial highway to east coast, and, in case the ice-cap is coëxtensive with the